PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
LARRY E. HENNEMAN JR.
HENNEMAN & ASSOCIATES, PLC
714 W. MICHIGAN AVE.
TREE RIVERS, MI 49093

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 0057-029P1PCT	Date of mailing *(day/month/year)* 08 DEC 2008 **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US 08/05335	International filing date *(day/month/year)* 25 April 2008 (25.04.2008)
Applicant TECHNOLOGY PROPERTIES LIMITED	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 740 14 35

   For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/220 (January 2004) *(See notes on accompanying sheet)*

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 0057-029P1PCT	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 08/05335	International filing date *(day/month/year)* 25 April 2008 (25.04.2008)	(Earliest) Priority Date *(day/month/year)* 27 April 2007 (27.04.2007)
Applicant TECHNOLOGY PROPERTIES LIMITED		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 9 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

   ☒ the text is approved as submitted by the applicant.

   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   ☒ the text is approved as submitted by the applicant.

   ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

   a. the figure of the **drawings** to be published with the abstract is Figure No. 7

   ☒ as suggested by the applicant.

   ☐ as selected by this Authority, because the applicant failed to suggest a figure.

   ☐ as selected by this Authority, because this figure better characterizes the invention.

   b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 08/05335

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G06F 15/167 (2008.04)
USPC - 709/213
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
USPC - 709/213

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 709/240, 201-202, 208, 232; 345/506, 504; 712/10, 16, 18, 23; (View search terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST(PGPB,USPT,USOC,EPAB,JPAB): Search terms: multiple, multi-cpu, multi-processor, cpu, processor, computer, pipeline, array, single instruction word, asynchronous, stack, push, pop, set, bit, register

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2005/0206648 A1 (PERRY et al.) 22 September 2005 (22.09.2005) entire document, especially Fig. 3 and para [0026]-[0029]	1-3, 10-11, 13-15, 19 --- 4-9, 12, 16-18, 20
Y	US 2004/0250046 A1 (GONZALEZ et al.) 09 December 2004 (09.12.2004) especially Fig. 8 and para [0019]	4-7, 16-17
Y	US 2005/0027548 A1 (JACOBS et al.) 03 February 2005 (03.02.2005) especially para [0007]; para [0035]	8-9, 12, 18, 20

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 November 2008 (14.11.2008)	08 DEC 2008
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (April 2007)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
LARRY E. HENNEMAN JR.
HENNEMAN & ASSOCIATES, PLC
714 W. MICHIGAN AVE.
TREE RIVERS, MI 49093

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	08 DEC 2008
Applicant's or agent's file reference 0057-029P1PCT	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 08/05335	25 April 2008 (25.04.2008)	27 April 2007 (27.04.2007)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - G06F 15/167 (2008.04)
USPC - 709/213

Applicant TECHNOLOGY PROPERTIES LIMITED

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	14 November 2008 (14.11.2008)	Lee W. Young PCT Helpdesk: 571-272-4300. PCT OSP: 571-272-7774

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 08/05335

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form

      ☐ furnished subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 08/05335

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	4-12, 16-20	YES
	Claims	1-3, 13-15	NO
Inventive step (IS)	Claims	none	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	none	NO

2. Citations and explanations:

Claims 1-3 and 13-15 lack novelty under PCT article 33(2) as being anticipated by US 2005/0206648 A1 to Perry et al. (hereinafter 'Perry').

Regarding claim 1, Perry discloses a method for a series of computers to process data, wherein the series of computers includes a first computer and a last computer, and wherein each of the computers except the first computer is preceded by a prior computer and each of the computers except the last computer is followed by a subsequent computer (Fig. 3 shows stages 1 - N), the process comprising: in each of the computers viewed as a current computer: (a) reading new data with the current computer (see para [0026]-[0029]. "Third, a result of querying the progressive cache 330, i.e., the most complete cached element, is sent, i.e., piped, to the appropriate processing stage, i.e., the next stage of the corresponding stage of the pipeline" at para [0028]); (b) after said (a), writing old data with the current computer ("After each stage completes processing, the output of the stage can also be sent, i.e., piped, back to the progressive cache" at para [0029]); (c) after said (b), processing said new data in said current computer to produce said old data ("After each stage completes processing, the output of the stage can also be sent, i.e., piped, back to the progressive cache" at para [0029]); and (d) after said (c), if the current computer is not the last computer, holding said old data in the current computer (The old data is stored in the cache element corresponding to the processing stage, as shown in Fig. 3).

Regarding claim 2, Perry discloses that (a) includes reading said old data from the prior computer as said new data or, in the case of the first computer, reading the data from outside of the series of computers as said new data (Fig. 3 shows data flow from Stage 1 serially to Stage N. Stage 1 takes outside data as input as shown).

Regarding claim 3, Perry discloses that (b) includes writing said old data to the subsequent computer or, in the case of the last computer, writing said old data to outside the series of computers (Fig. 3 shows data flow from Stage 1 serially to Stage N. Stage N writes data as output, as shown).

Regarding claim 13, Perry discloses a series of computers to process data, wherein the series of computers includes a first computer and a last computer, and wherein each of the computers except the first computer is preceded by a prior computer and each of the computers except the last computer is followed by a subsequent computer (Fig. 3 shows stages 1 - N), the computers each comprising: a logic to read new data via a first data path (see para [0026]-[0029]. "Third, a result of querying the progressive cache 330, i.e., the most complete cached element, is sent, i.e., piped, to the appropriate processing stage, i.e., the next stage of the corresponding stage of the pipeline" at para [0028]); a logic to write old data via a second data path "After each stage completes processing, the output of the stage can also be sent, i.e., piped, back to the progressive cache" at para [0029]); a logic to process said new data to produce said old data "After each stage completes processing, the output of the stage can also be sent, i.e., piped, back to the progressive cache" at para [0029]); and except for the last computer, a storage element to store said old data (The old data is stored in the cache element corresponding to the processing stage, as shown in Fig. 3); wherein said logic to write operates after said logic to read and said logic to write operates before said logic to process (para [0026]-[0029] outline data flow).

Regarding claim 14, Perry discloses that the logic to read reads said old data from the prior computer as said new data or, in the case of the first computer, reads the data from outside of the series of computers as said new data (Fig. 3 shows data flow from Stage 1 serially to Stage N. Stage 1 takes outside data as input as shown).

Regarding claim 15, Perry discloses that the logic to write writes said old data to the subsequent computer or, in the case of the last computer, writes said old data to outside the series of computers (Fig. 3 shows data flow from Stage 1 serially to Stage N. Stage N writes data as output, as shown).

Claims 10-11 and 19 lack an inventive step under PCT article 33(3) as being obvious over Perry.

Regarding claim 10, Perry does not explicitly disclose that (c) includes executing multiple instructions in an instruction word. However, it is well known in the art to execute multiple commonly performed instructions using a single instruction word to save processing time. It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the method disclosed by Perry to include executing multiple instructions in an instruction word, as is known in the art, in order to reduce processing time.

--- see continuation sheet ---

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Box No. V.2. Citations and explanations:

Regarding claim 11, as with claim 10, it would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the method disclosed by Perry such that (a) and (b) are executed by a program in a single said instruction word as is known in the art, to reduce processing time.

Regarding claim 19, Perry does not explicitly disclose that the logic to read and said logic to write execute by a program in a single instruction word. However, it is well known in the art to execute multiple commonly performed instructions using a single instruction word to save processing time. It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the method disclosed by Perry such that the logic to read and said logic to write execute by a program in a single instruction word as is known in the art, to reduce processing time.

Claims 4-7 and 16-17 lack an inventive step under PCT article 33(3) as being obvious over Perry in view of US 2004/0250046 A1 to Gonzalez et al. (hereinafter 'Gonzalez').

Regarding claim 4, Perry does not explicitly disclose that the series of computers is an array of computers connected with data paths by two or more dimensions to intercommunicate, although Perry does disclose that the computers may communicate with computers other than the next computer in the serial chain ("This means that processing stages can be by-passed" at para [0028]). Gonzalez teaches a multiple processor system using a two dimensional array of processors (see Fig. 8 and para [0019]). It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the system disclosed by Perry such that the series of computers is an array of computers connected with data paths by two or more dimensions to intercommunicate as taught by Gonzalez, in order to increase the number of processors used without lengthening the data path.

Regarding claim 5, Perry further teaches addressing said data paths to at least the prior computer and the subsequent computer with programmatically settable bits such that said current computer can communicate via said data paths based on which said bits are concurrently set ("the progressive cache 330 is queried 321 by the cache manager 320 to determine a most complete cached element representing the output 309, e.g., cached elements contained in caches 351-355 of cache type 1-5, which is available to satisfy the processing request 301. Third, a result of querying the progressive cache 330, i.e., the most complete cached element, is sent, i.e., piped, to the appropriate processing stage" at para [0027]-[0028], eg: the contents of the cache (set bits) determine which processing stage will be next).

Regarding claim 6, Perry further teaches that (a) includes reading said new data from one of multiple of the computers that are concurrently specified by said bits ("the progressive cache 330 is queried 321 by the cache manager 320 to determine a most complete cached element representing the output 309, e.g., cached elements contained in caches 351-355 of cache type 1-5, which is available to satisfy the processing request 301. Third, a result of querying the progressive cache 330, i.e., the most complete cached element, is sent, i.e., piped, to the appropriate processing stage" at para [0027]-[0028], eg: the contents of the cache (set bits) determine which processing stage will be next).

Regarding claim 7, Perry further teaches that (b) includes writing said old data to one of multiple of the computers that are concurrently specified by said bits ("the progressive cache 330 is queried 321 by the cache manager 320 to determine a most complete cached element representing the output 309, e.g., cached elements contained in caches 351-355 of cache type 1-5, which is available to satisfy the processing request 301. Third, a result of querying the progressive cache 330, i.e., the most complete cached element, is sent, i.e., piped, to the appropriate processing stage" at para [0027]-[0028], eg: the contents of the cache (set bits) determine which processing stage will be next).

Regarding claim 16, Perry does not explicitly disclose that the series of the computers is an array of the computers connected with multiple of first data paths and multiple of the second data paths in two or more dimensions, although Perry does disclose that the computers may communicate with computers other than the next computer in the serial chain ("This means that processing stages can be by-passed" at para [0028]). Gonzalez teaches a multiple processor system using a two dimensional array of processors (see Fig. 8 and para [0019]). It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the system disclosed by Perry such that the series of the computers is an array of the computers connected with multiple of first data paths and multiple of the second data paths in two or more dimensions as taught by Gonzalez, in order to increase the number of processors used without lengthening the data path.

Regarding claim 17, Perry further teaches a register having bits programmatically settable to address each of said data paths such that the computer can communicate via multiple of said data paths based on which said bits are concurrently set, thereby permitting a single address in said register to represent both a source and a destination for the data ("the progressive cache 330 is queried 321 by the cache manager 320 to determine a most complete cached element representing the output 309, e.g., cached elements contained in caches 351-355 of cache type 1-5, which is available to satisfy the processing request 301. Third, a result of querying the progressive cache 330, i.e., the most complete cached element, is sent, i.e., piped, to the appropriate processing stage" at para [0027]-[0028], eg: the contents of the cache (set bits) determine which processing stage will be next).

--- see continuation sheet ---

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box No. V.2. Citations and explanations:

Claims 8-9, 12, 18, 20 lack an inventive step under PCT article 33(3) as being obvious over Perry in view of US 2005/0027548 A1 to Jacobs et al. (hereinafter 'Jacobs').

Regarding claim 8, Perry does not explicitly disclose that (a) includes pushing said new data on to a stack. Jacobs teaches a system that uses a stack to store data ("rank the rollup values for the billing period in a stack" at para [0007]). It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the system disclosed by Perry to include pushing said new data on to a stack as taught by Jacobs, to easily store data temporarily that will quickly be reaccessed.

Regarding claim 9, Perry does not explicitly disclose that (b) includes popping said old data off of a stack. Jacobs teaches a system that uses a stack to store data ("rank the rollup values for the billing period in a stack" at para [0007]). It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the system disclosed by Perry to include popping said old data off of a stack as taught by Jacobs, to easily store data temporarily that will quickly be reaccessed.

Regarding claim 12, Perry does not explicitly disclose that at least one of said (a), said (b), and said (c) is performed asynchronously. Jacobs teaches a system with elements that perform operations asynchronously ("arrayed elements of the forwarding engine 390 (described below) may be operatively configured to function asynchronously" at para [0035]). It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the system disclosed by Perry such that at least one of said (a), said (b), and said (c) is performed asynchronously as taught by Jacobs, in order to speed operation by not waiting for the next clock cycle.

Regarding claim 18, Perry does not explicitly disclose that the logic to read pushes said new data on to a stack; and said logic to write pops said old data off of said stack. Jacobs teaches a system that uses a stack to store data ("rank the rollup values for the billing period in a stack" at para [0007]). It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the system disclosed by Perry such that the logic to read pushes said new data on to a stack; and said logic to write pops said old data off of said stack as taught by Jacobs, to easily store data temporarily that will quickly be reaccessed.

Regarding claim 20, Perry does not explicitly disclose that at least one of logic to read, logic to write, and logic to process performs asynchronously. Jacobs teaches a system with elements that perform operations asynchronously ("arrayed elements of the forwarding engine 390 (described below) may be operatively configured to function asynchronously" at para [0035]). It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the system disclosed by Perry such that at least one of logic to read, logic to write, and logic to process performs asynchronously as taught by Jacobs, in order to speed operation by not waiting for the next clock cycle.

Claims 1-20 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used by industry.